

## ELECTRICITY AND GAS.

The Probable Future of Each—Gas as a Heating Agent.

From the Address of Dr. C. W. Siemens.

The largest and most extensive application of electric energy at the present time is to lighting, but, considering how much has of late been said and written for and against this new illuminant, I shall here confine myself to a few general remarks. Joule has shown that if an electric current is passed through a conductor the whole of the energy lost by the current is converted into heat, or, if the resistance be localized, into radiant energy comprising heat, light, and actinic rays. Neither the low heat rays nor the ultra violet of highest refrangibility effect the retina, and may be regarded as lost energy, the effective rays being those between the red and violet of the spectrum, which to their combination produce the effect of white light. \* \* \* The principal argument in favor of the electric light is furnished by its immunity from products of combustion which not only heat the lighted apartments, but substitute carbonic acid and deleterious sulphur compounds for the oxygen upon which respiration depends; the electric light is white instead of yellow, and thus enables us to see pictures, furniture, and flowers as well as by daylight; it supports growing plants instead of poisoning them, and by its means we can carry photography and many other industries at night as well as during the day. The objection frequently urged against the electric light, that it depends upon the continuous motion of steam or gas engines, which are liable to accidental stoppage, has been removed by the introduction into practical use of the secondary battery; this, although not embodying a new conception, has lately been greatly improved in power and constancy by Plante, Faure, Volckman, Sellon, and others, and promises to accomplish for electricity what the gas-holder has done for the supply of gas and the accumulation of power. It can no longer be a matter of reasonable doubt, therefore, that electric lighting will take its place as a public illuminant, and that even though its cost should be found greater than that of gas, it will be preferred for the lighting of drawing-rooms, theaters and concert-rooms, museums, churches, warehouses, show-rooms, printing establishments, and factories, and also the cabins and engine-rooms and passenger steamers. In the cheaper and more powerful form of the arc light it has proved itself superior to any other illuminant for spreading artificial daylight over the large areas of harbors, railway stations, and the sites of public works. When placed within a holophote the electric lamp has already become a powerful auxiliary in effecting military operations both by sea and land. The electric light may be worked by natural sources of power, such as waterfalls, the tidal wave, or the wind, and it is conceivable that these may be utilized at considerable distances by means of metallic conductors. Assuming the cost of electric light to be practically the same as gas, the preference for one or other will in each application be decided upon grounds of relative convenience, but I venture to think gas lighting will hold its own as the poor man's friend.

Gas is an institution of the utmost value to the artisan; it requires hardly any attention, is supplied upon regulated terms, and gives with what should be a cheerful light a genial warmth, which often saves the lighting of a fire. The time is, moreover, not far distant, I venture to think, when both rich and poor will largely resort to gas as the most convenient, the cleanest, and the cheapest of heating agents, and when raw coal will be seen only at the colliery or the gas-works. In all cases where the town to be supplied is within thirty miles of the colliery, the gas-works may with advantage be planted at the mouth, or still better, at the bottom of the pit, whereby all haulage of fuel would be avoided, and the gas, in its ascent from the bottom of the colliery, would acquire an upward pressure sufficient probably to impel it to its destination. The possibility of transporting combustible gas through pipes for such a distance has been proved at Pittsburgh, where natural gas from the oil district is used in large quantities. The quasi monopoly so much enjoyed by gas companies has had the inevitable effect of checking progress. The gas being supplied by meter, it has been seemingly to the advantage of the companies to give merely the prescribed

illuminating power, and to discourage the invention of economical burners, in order that the consumption might reach a maximum. The application of gas for heating purposes has not been encouraged, and is still made difficult in consequence of the objectionable practice of reducing the pressure in the mains during day-time to the lowest possible point consistent with prevention of atmospheric indraught. The introduction of the electric light has convinced gas managers and Directors that such a policy is no longer tenable, but must give way to one of technical progress; new processes for the cheapening the production and increasing the purity and illuminating power of gas are being fully discussed before the Gas Institute; and improved burners rivaling the electric light in brilliancy greet our eyes as we pass along our principal thoroughfares.

Regarding the importance of the gas supply as it exists at present, we find from a Government return that the capital invested in gasworks in England, other than those of local authorities, amounts to £30,000,000; in these 4,281,048 tons of coal are converted annually producing 43,000,000,000 cubic feet of gas and about 2,800,000 tons of coke; whereas the total amount of coal annually converted in the United Kingdom may be estimated at 9,000,000 tons, and the by-products therefrom at 500,000 tons of tar, 1,000,000 tons of ammonia liquor, and 4,000,000 tons of coke, according to the returns kindly furnished me by the managers of many of the gas-works and corporations. To these may be added, say, 120,000 tons of sulphur, which up to the present time is a waste product. The total annual value of the gas-works' by-products may be estimated as follows: Coloring matter, £3,350,000; sulphate of ammonia, £1,947,000; pitch (325,000 tons), £265,000; creosote (25,000,000 gallons), £208,000; crude carbolic acid (1,000,000 gallons), £100,000; gas coke, 4,000,000 tons (after allowing 2,000,000 tons consumption in working the retorts, at 12s., £2,400,000; total £8,370,000. Taking the coal used 9,000,000 tons, at 12s., equal £5,400,000, it follows that the by-products exceed in value the coal used by very nearly £3,000,000. In using raw coal for heating purposes these valuable products are not only absolutely lost to us, but in their stead we are favored with those semi-gaseous by-products in the atmosphere too well known to the denizens of London and other large towns as smoke. Prof. Roberts has calculated that the soot in the pall hanging over London on a winter's day amounts to fifty tons, and that the carbonic oxide, a poisonous compound, resulting from the imperfect combustion of coal, may be taken at at least five times that amount. The most effectual remedy would result from a general recognition of the fact that wherever smoke is produced fuel is being consumed wastefully, and all our calorific effects, from the largest down to the domestic fire can be realized as completely, and more economically, without allowing any of the fuel employed to reach the atmosphere unburned. The most desirable result may be effected by the use of gas for all heating purposes with or without the addition of coke or anthracite. The cheapest form of gas is that obtained through the entire distillation of fuel in such gas producers as are now largely used in working the furnaces of glass, iron, and steel works; but gas of this description would not be available for the supply of towns, owing to its bulk, about two-thirds of its volume being nitrogen. The use of water-gas, resulting from the decomposition of steam in passing through a hot chamber filled with coke, has been suggested, but this gas also is objectionable, because it contains, besides hydrogen, the poisonous and inodorous gas carbonic oxide, the introduction of which into dwelling houses could not be effected without considerable danger.

A most satisfactory mode of supplying heating separately from illuminating gas would consist in connecting the retort at different periods of the distillation with two separate systems of mains for the delivery of the respective gases. Experiments made some years ago by Mr. Ellisen, of the Paris Gas-works, have shown that the gases rich in carbon, such as acetylene and acetylene, are developed chiefly during an interval of time, beginning half an hour after the commencement and terminating at half the whole period of distillation, while during the remainder of the time marsh gas and hydrogen are chiefly developed, which, while possess-

ing little illuminating power, are most advantageous for heating purposes. By resorting to an improved means of heating the retorts with gaseous fuel, such as have been in use at the Paris gas-works for a considerable number of years, the length of time for effecting such distillation may be shortened from six hours, the usual period in former years, to four or even three hours, as now practiced at Glasgow and elsewhere. By this means a given number of retorts can be made to produce, in addition to the former quantity of illuminating gas of superior quality, a similar quantity of heating gas, resulting in a diminished cost of production and an increased supply of the valuable by-products previously referred to. The quantity of both ammonia and heating gas may be further increased by the simple expedient of passing a streamlet of steam through the heated retorts toward the end of each operation, whereby the ammonia and hydrocarbon still occluded in the heated coke will be evolved, and the volume of heating gas produced be augmented by the products of the decomposition of the steam itself. It has been shown that gas may be used advantageously for domestic purposes with judicious management even under present conditions, and it is easy to conceive that the consumption for heating would soon increase, perhaps ten-fold, if supplied separately at, say, 1s. per 1,000 cubic feet. At this price gas would not only be the cleanest and most convenient, but also the cheapest form of fuel, and the enormous increase of consumption, the superior quality of the illuminating gas obtained by selection, and the proportionate increase of by-products, would amply compensate the gas company or corporation for the comparatively low price of the heating gas. The greater efficiency of gas as a fuel results chiefly from the circumstance that a pound of gas yields in combustion 22,000 heat units, or double the heat produced in the combustion of a heating power is due partly to the freedom of the gas from earthy constituents, but chiefly to the heat imparted to it in effecting its distillation. Recent experiments with gas-burners have shown that in this direction also there is much room for improvement.

### Faithful to the Last.

"Be brave, Beryl." The north wind was howling fiercely through the cordage of a staunch vessel as she dashed madly through the seething waters that stretched away from her on every side in desolate fury. Now poised on the crest of a great green billow, and anon plunged into a watery depth that seemed to end only in the bosom of the earth, the good ship struggled bravely with the mighty forces of the tempest: but, though her timbers might groan in almost human agony, there was no parting of the seams, no weakening of the bolts that held deck and bulwark together in so firm a clasp.

It was Beryl McCloskey's wedding trip. Two days ago she had been joined in wedlock's holy bonds to George W. Simpson, and her mother had consented to go with them on their bridal journey. It was her loving arm that supported Beryl now, her kindly voice that spoke the words with which this chapter opens.

"George cannot love me, mamma," the girl said, speaking in low, mellow tones, "or he would be at my side now, when I need him so sorely."

"Do not judge hastily, my child," replied the mother. "George is pretty busy. Even now I see him leaning over the vessel's side."

"Is he then so very sick?" asked Beryl.

"Quite very," said Mrs. McCloskey.

"Has he thrown up his position?"

"No, my darling."

"Then," said the girl, a holy love-light illumining her pure young face, "I will never leave him."—*Chicago Tribune.*

KALAMAZOO, MICH., Feb. 2, 1880.

I know Hop Bitters will bear recommendation honestly. All who use them confer upon them the highest encomiums, and give them credit for making cures—all the proprietors claim for them. I have kept them since they were first offered to the public. They took high rank from the first, and maintained it, and are more called for than all others combined. So long as they keep up their high reputation for purity and usefulness, I shall continue to recommend them—something I have never before done with any other patent medicine.

J. J. BARCOCK, M. D.

A SCHOOLMARM who was recently kissed by mistake in the dark, explains her omission to use any light for nearly a month afterward, on the ground of hard times.

## BIRMINGHAM.

The Phoenix-Like Growth of an Alabama Town. Nashville American.

Six years, and what a change! I pledge you my word I would not recognize the town. At that time Birmingham, whose phoenix like growth had been heralded all over the land, was as dead as a door nail.

It was not until 1878 that the new Birmingham commenced to loom up. The Pratt coal mines were opened, and when the quality of the coal was discovered to be as fine as any on the continent, the manufacture of iron at this point was deemed practical and the mill was opened. Since then the new enterprises which have been inaugurated have had a regular cotillion party. Lively? Well, you just never saw anything like it. Here's a statement; look at it:

There are \$2,000,000 worth of buildings going on to-day in Birmingham.

And this is simply astonishing: Not a city in the entire south can make this showing; not one. Atlanta, for 1882, will add \$1,000,000 worth of improvements; Macon, \$750,000; Augusta, with the King mill, \$1,500,000; Chattanooga, \$500,000; Knoxville, \$500,000, and Birmingham, with a population now close on to 12,000, comes up with \$2,000,000. It sounds and looks like romance, and I verily believe I would doubt the statement myself were I not here to see it with my own eyes. Every man I meet here tells me confidently "our growth is not yet commenced."

Well, all I have to say is that if Birmingham keeps this thing up she'll make the welkin ring with her shouts of enterprise and wealth and growth. In four years the population has just quintupled, or 500 per cent. And this, you know, is enormous, there being no other city in this country able to make so grand a showing. Said a man just from the west the other day:

"Nothing out there that I have seen can touch Birmingham's growth within the past two years." Real estate men tell me that property is daily advancing and that buyers are coming in almost hourly. I heard a real estate man say at the hotel this morning:

"I actually cannot keep up with the building going on here. Coming to breakfast now I saw two new brick stores going up where two days ago the ground was not broken, and I knew nothing of them."

### INCREASE OF VALUES.

As an evidence of how values have increased, two years ago Dr. Caldwell, of the Elyton Land Company, bought a lot on which stood three wooden structures meant for stores, for which he paid \$2,000. Six months later he was getting \$1,800 for the stores. The lot is 100 feet square. The wooden houses were burned, brick ones erected, and yesterday the doctor was offered \$5,000 for one-half the lot which is unbuild. In 1879 the Elyton Land company sold \$20,000 worth of land here; in 1880 they sold about \$40,000, and in 1881 about \$80,000 worth, while with only eight months of 1882 gone they have sold \$120,000 worth of lots. The greater portion of this property is right in Birmingham.

But I am asked is this boom started on an inflation basis? Not at all, I assure you. There is absolutely nothing to prevent the future growth of Birmingham. It will be within a few years one of the leading manufacturing cities in America. It will be a matter of astonishment to know that Birmingham is now shipping iron to Pittsburgh, and is reaping a good profit. Pittsburgh has to send her iron two hundred miles to get to the coal; Birmingham has both at her doors. Chattanooga's manufacturing pay \$1.75 per ton for coal; Knoxville pays about \$1.40, while Atlanta has to stand \$3.50 per ton. Birmingham drops the carbon into the furnaces, shops and foundries at one dollar per ton, and this is where she gets her grip on the world. A dollar per ton for coal! Just think how small that sounds. It costs 62 cents to mine Shoddy coal, nearly the same to mine Coal Creek coal, while the Pratt and Milner mines bring it to the light for 45 cents. When a man wants to put \$100,000 in a manufacturing enterprise, he considers those expenses which he knows will be permanent. A dollar per ton difference in coal is an item that will be lasting and that must be considered. All these advantages Birmingham has. In a subsequent letter I propose to show a few points about the manufacture of iron and the figures to be had here as to profits and advantages over other places.

### POINTS.

Birmingham has as fine a system of waterworks as can be found in the south. They were erected and are owned by the Elyton Land company, and have a daily capacity of 2,000,000 gallons. The cost of the works was \$150,000. A system of hydrants was conveniently located throughout the city, and property is well protected from fire. The gravity pressure on the works is 90 pounds to the square inch, the reservoir being 150 feet above the city.

The coal supply around Birmingham is practically without limit. The present capacity of the three mines now being worked here is 4,000 tons daily, or 1,460,000 tons annually. This is nearly four times the total of the Shoddy and East Tennessee mine combined. There are over 6,000 men employed here in the different enterprises, the capital and fuller details being reserved for a later letter.

The postoffice here is second class

and does a greater business than Selma. The receipts are daily increasing. Eight railroad mails are received daily and the same dispatched. Mr. Thomas U. Green is postmaster, assisted by his three charming daughters. For the July quarter there were 2,410 money orders issued, amounting to over \$20,000, the fees being \$279.85. Orders paid, \$11,164.29. Letters registered, 639. This is a remarkable showing.

### Wealth Contained in a Cotton Boll.

Planter's Journal.

The essay on "Cotton Seeds, their Products and Uses," read by Prof. H. C. White, of the State University, at Marietta, Ga., was of great interest. Prof. White said that it was the function of plants to reproduce its kind. The seed is consequently the important part of plants. In the cotton plant the seed is covered with a fuzzy substance, which is cotton. Cotton is not affected by the weather, is not soluble; is capable of being twisted into thread. The cultivation of cotton has been for this covering, cotton itself; the seed being much neglected. All seeds contain a germ, or nucleus, from which the plant springs. In the cotton seed this germ is surrounded by chemical and mineral properties.

### COTTON SEED AND THE CEREALS.

The difference between cotton seeds and cereals consists in the amount of starch, oil or fat, and cellulose. He argued, scientifically, that whilst cotton seed, being deficient in starch, was not proper food for man, having an abundance of oil or fat, it was proper food for cattle.

### WHAT THE SEED OF STAPLE IS.

Of one hundred pounds of seeds about one-half is hull and one-half kernel. The hull is nothing but cellulose, and no more fit for food than saw-dust, but may be used as fuel, and the ashes as fertilizer: the ashes contain about 33 per cent of potash and 5½ per cent of phosphoric acid.

The kernel contains about 50 per cent of oil, but the most improved method of pressing yields only about 20 per cent. of oil, leaving about 80 per cent. of cake. Cotton seed cake has 14 per cent. of oil, 41 per cent. of albumoids, sugar 22 per cent., cellulose 6 per cent, and mineral matter 7 per cent.

### THE PRESSED MEAL AS A FOOD PRODUCT.

Cotton seed meal is the best food ever on the market for flesh and fat-forming purposes. The normal food for cattle, corn, contains 10 per cent. of albumenoids, and any substance which contains a greater quantity is too hard of digestion. But mix corn, which contains a great quantity of starch, with an equal quantity of meal, and it will give proper food for stock. The manure of cattle fed on cotton seed meal yields about 6 per cent of ammonia, whilst the manure from cattle fed on corn yields but 2 per cent. of ammonia.

### THE PROPERTIES OF THE OIL.

Cotton seed oil is rather negative in its properties. If you let it stand in the air it will dry, and consequently will not do for illuminating purposes; but as it takes rather long to dry, it cannot be used for paints. Cotton seed oil stands on the border of the two kinds of oil—drying and non-drying. It can be used as an excellent food; it is better chemically, than butter; it contains no albumenoids, and consequently does not become rancid; it is easily digested. It can be used as a preserving agent for such as fish, sardines, etc. Cotton seed oil has no other future than as a food and as a preserving agent. There are seventy cotton seed oil mills in this country, which use 200,000 tons of cotton seed annually.

### Candidates and the State Debt.

The following items taken from the Cleburne Telegram are suggestive:

Some cattle men with whom we recently met suggested a plan by which the candidates now before the people of Texas could pay off the state debt amounting to more than \$1,000,000. This gives office seekers the grandest opportunity possible to show their patriotism. The plan is this: Let each of the 10,000 candidates pick 250 pounds of cotton per day, which is considered the smallest amount that should be expected of a man with energy enough to go through a political campaign. This would aggregate \$1,500,000. Supposing the average cost of the canvas to be \$50 gives \$500,000, which added gives \$2,000,000. Thus it appears that two campaigns of sixty days each would put Texas out of debt and leave the candidates no poorer than they find themselves, at the end of the race, defeated. Who will be the first to lead off? Give us an example.

—Commissioner Walsh desires the address of every candidate for the legislature. For the reason he will specify in a circular to be sent to said candidates upon receipt of their address. Send in your addresses, gentlemen.

In Turkey there is no love-making. If a man wants a woman he purchases her, and they do say that in the long run it don't cost a Turk half so much as if he had to invest his cash in carriage hire, opera seats and ball tickets while courting.

In Genesee, N. Y., there are 307 unmarried women of marriageable age, and but 55 unmarried men.